

## Lock requiring reduced opening force.

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### Abstract

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The lock is formed from a fork (6) which engages a striker (4) pin and is itself engaged at one end by a catch (10); its main characteristic is that between the fork (6) and catch (10) there is interposed a rotatable insert (20) which pivots at one end against the catch (10) and is arranged to cooperate at its other end with the hook-shaped end (16) of the fork (6), said insert (20) being dragged rigidly with the catch (10) by a spring (25) connected to the insert (20) eccentric to the position in which this latter pivots against the catch (10).

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### Description

This invention relates to a vehicle lock requiring a reduced opening force.

Vehicle locks are known to comprise essentially a striker pin usually fixed on the pillar of the door opening, a rotatable fork engaging the striker pin at the moment the door is closed and usually carried on this latter, and a catch mounted to the side of the fork and arranged to cooperate with it after closure, to prevent its rotation and thus keep the lock fastened. During opening, to disengage the catch from the fork and thus allow this latter to freely rotate, usually under the effect of the return force generated by elastic means, it is necessary to overcome the force acting between the fork and catch due to the friction generated between the catch and the fork by the elastic reaction of the perimetral door gaskets. This force can be considerable, so that in the case of a manually operated lock the user has to apply a certain force to open the door, a fact which can disturb the user because it gives the impression that the lock, which is thus "hard", is operating incorrectly, therefore generally reducing the degree of comfort of the vehicle.

The object of the invention is to provide a vehicle lock requiring the use of only a small opening force, even if the forces acting between the fork and catch are relatively high.

Said object is attained according to the invention by a vehicle lock, of the type comprising a striker pin, a rotatable fork which engages said pin, and a catch arranged to prevent the rotation of said fork when it engages said pin, characterised by also comprising a rotatable insert which pivots at a first end against the catch in such a manner as to be interposed between the fork and catch when the fork engages said pin; said insert being arranged to cooperate, by means of its second end distant from the first, with a hook-shaped portion of the fork, and being dragged rigidly with the catch by a spring connected to the insert eccentric to the position in which this latter pivots against the catch.

The invention will be more apparent from the non-limiting description of two embodiments thereof given hereinafter with reference to the accompanying drawings in which:

Figure 1 shows a vehicle provided with the lock according to the invention;

Figures 2 and 3 are schematic views of the lock according to the invention in two different operating positions, and of which only the main components are shown.

In Figures 1, 2 and 3 the reference numeral 1 indicates overall a lock for a vehicle 2 of any type, the lock being shown schematically in terms only of its main components, the remaining details being known and therefore not shown for simplicity.

The lock 1 comprises a striker pin 4, for example fixed to the upright of a door opening 5 of the vehicle 1, a fork 6 carried for example by a door 8 of the vehicle 1 such that it can rotate about a pin

5 7 (Figure 3) which is parallel to the pin 4 when the lock 1 is closed, and a catch 10 supported rotatably on a pin 11 which is parallel to the pin 7 and is carried rigidly with this latter by the same element of the vehicle 1, in this case the door 8.

10 The catch 10 and the fork 6, which are usually both carried inside a known holder or lock plate, not shown, fixed rigidly to the door 8, and are provided on the pins 7, 11 with elastic opposition means, also of known type and not shown for simplicity, are arranged to cooperate with each other when the lock 1 is closed, ie when in the configuration shown in Figure 2, to prevent rotation of the fork 6. In this respect, this latter, at the moment the door 8 is closed within the opening 5,

15 engages the striker pin 4 in the manner shown, by rotating on the pin 7 against the action of its own elastic return means. When engagement has taken place the catch 10, by the effect of the relative position of the pivot points 7 and 11 and under the action of its own elastic return means, rotates on the pin 11 so that its hook-shaped end 15, distant from the pin 11, engages a corresponding externally hook-shaped end 16 of the fork 6.

20 According to the invention, the cooperation between the catch 10 and fork 6 when the lock 1 is closed is obtained indirectly, in that the lock 1 comprises a rotatable insert 20 which pivots at a first end 21 against the catch 10 so as to be interposed between the fork 6 and the catch 10 when the fork 6 engages the pin 4, ie when the lock 1 is closed. The insert 20 also comprises a second end 22, distant from the end 21, by which it cooperates with a hook-shaped portion of the fork 6, defined in the present case by the end 16.

25 The insert 20 is dragged rigidly with the catch 10 by a spring 25 connected to the insert 20 eccentric to the position in which this latter pivots against the catch 10. Specifically, the insert 20 is provided laterally with a projecting appendix 26 engaged with clearance in a seat 27 provided in the catch 10 and defined by a pair of opposing respective stop shoulders 28 and 29 arranged to the insert 20 can rotate. Consequently, the spring 25 is connected to the insert 20 at a point or fulcrum, indicated by 30, which lies to the side of the centre line through the end 21 in the direction of the appendix 26 and is situated closer to the end 22 than is the appendix 26.

30 In the non-limiting illustrated case, the insert 20 is housed in a concavity 32 defined by the end 15 of the catch 10 and facing the fork 6, and by means of its end 21, under the pulling action of the spring 25, it projectingly engages a recess 35

provided in the catch 10. The end 21 and recess 35 are bounded by a conjugate semicircular profile, such as to define a rotation fulcrum for the insert 20.

The spring 25 comprises an intermediate portion 40 wound about the pin 11 and a pair of V-forming opposing arms 41, 42, a first of which (the arm 41) is connected to the insert 20 at the point or fulcrum 30, and the second of which (the arm 42) is mounted to straddle the catch 10 at the opposite side to the insert 20.

When in use, the closure of the door 8 causes the fork 6 to engage the pin 4 followed by the descent of the catch 10, the insert 20 of which cooperates by means of its end 22 with the end 16, and is moved by this (if not already in position) against the shoulder 28, to consequently secure the fork 6 and fasten the lock 1. In this configuration the fork 6 and catch 10 act on each other by way of the insert 20 with a force F, which is applied to the fork 6 by the pin 4 and is due to the elastic reaction of the perimetral gaskets of the door 8. To open the lock 1, the user is known lever system, not shown for simplicity. In the case of the lock 1 the force T is very low and in any event needs to be applied only in the initial stage, the lock 1 opening entirely automatically and independently of the extent of the force F produced by the gaskets, once it has started to do so by virtue of the initial movement of the catch 10.

In this respect, by the effect of the force F the catch 10 begins to withdraw from the fork 6 (Figure 2) and the insert 20 rotates in the opposite direction to the catch 10, to cause the appendix 26 to withdraw from the shoulder 28 towards the shoulder 29.

During this stage the force T which has to be applied is very small, as it corresponds substantially to that required to overcome only the friction forces at the fulcrum 35. The rotation of the insert 20 also allows the fork 6 to undergo an initial limited rotation, and consequently the lock 1 begins to open, to finally assume the configuration of Figure 3. During this initial opening stage the force T to be applied increases progressively, but is always low as the movement towards the position of Figure 3 causes the fork 6 to apply to the end 22, under the effect of the force F, a thrust which has no arm about the point 30, or only a very small arm such that said thrust combined with that exerted on said point 30 by the spring 25 produces only low resistance to the rotation of the insert 20.

Having attained a position substantially corresponding to that of Figure 3, the insert 20, which behaves substantially as a connecting rod, reaches a dead centre position, beyond which both the force applied at 30 by the spring 25 and the force acting between the insert 20 and end 16 assume a

positive arm about the fulcrum 35, causing the insert 20 to spontaneously snap against the shoulder 29 and thus complete its rotation. This rotation results in the creation of a component of the force acting between the insert 20 and end 16 in the same direction as the force T, to therefore cause the catch 10 to withdraw with consequent disengagement of the block 20 from the end 16, so leaving the fork 6 to rotate and disengage from the pin 4, with consequent opening of the lock 1. When this is again being closed, the catch 10 as it approaches the end 16 causes the insert 20 to rotate in the reverse direction, and when it passes the dead centre defined by the position of Figure 3 it moves until its appendix 26 lies against the shoulder 28, so restoring the initial configuration.

The advantages of the invention are apparent from the foregoing description. By simply interposing the insert 20 between the catch and fork, and retaining the insert in the described manner, a lock is obtained which is of equal reliability and operability to known locks 'but which requires the use of a considerably reduced opening force (with the lock opening by itself after the initial stage), to the advantage of user comfort. This is obtained at very low cost, as the general architecture of the lock is not changed.

#### Claims

1. A vehicle lock, of the type comprising a striker pin (4), a rotatable fork (6) which engages said pin, and a catch (10) arranged to engage a hook-shaped portion (16) of said fork to prevent its rotation when said fork engages said pin, characterised by also comprising a rotatable insert (20) which pivots at a first end (21) against the catch in such a manner as to be interposed between the fork and catch when the fork engages said pin; said insert being arranged to cooperate, by means of its second end (22) distant from the first, with a hook-shaped portion (16) of the fork, and being dragged rigidly with the catch (10) by a spring (25) connected to the insert eccentrically relative to the first end (21) about which the insert pivots against the catch (10).
2. A lock as claimed in claim 1, characterised in that said insert (20) is housed in a concavity delimited by a hook-shaped end (15) of said catch (10) which faces said fork (6) and, by means of said end and under the action of said spring (25), projectingly engages a recess (27) in said catch; this latter and said first end (21) of the insert being delimited by a conjugate semicircular profile, so as to define a rotation fulcrum for said insert.

3. A lock as claimed in claim 1 or 2, characterised in that said insert (20) is provided laterally with a projecting appendix (26) engaged with clearance in a seat (27) provided in the catch and defined by a pair of opposing respective stop shoulders (28, 29) arranged to cooperate with said appendix to limit the angle through which the insert can rotate.

4. A lock as claimed in claim 3, characterised in that said spring (25) is connected to said insert (20) at a point (30) which lies to the side of the centre line through said first end (21) in the direction of the appendix (26) and is situated closer to said second end (22) of the insert than is said appendix (26).

5. A lock as claimed in claim 3 or 4, characterised in that said spring (25) comprises an intermediate portion (40) wound about a support pin (11) for said catch and a pair of V-forming opposing arms (41, 42), a first of which (41) is connected to said insert (20) and the second of which (42) is mounted to straddle said catch (10) on the opposite side to said insert.

#### Patentansprüche

1. Ein Fahrzeugschloß des Typs, der versehen ist mit einem Schließstift (4), einer drehbaren Gabel (6), die mit dem Stift in Eingriff ist, und einer Sperrklinke (10), die so angeordnet ist, daß sie mit einem hakenförmigen Bereich (16) der Gabel in Eingriff ist, um deren Drehung zu verhindern, wenn die Gabel mit dem Stift in Eingriff ist, dadurch gekennzeichnet, daß es außerdem einen drehbaren Einsatz (20) umfaßt, der an einem ersten Ende (21) gegen die Sperrklinke schwenkt, derart, daß er sich zwischen der Gabel und der Sperrklinke befindet, wenn die Gabel mit dem Stift in Eingriff ist; wobei der Einsatz so angeordnet ist, der er mittels eines vom ersten Ende entfernten zweiten Endes (22) mit dem hakenförmigen Bereich (16) der Gabel zusammenwirkt und durch eine Feder (25) mit der Sperrklinke (10) starr mitgezogen wird, wobei die Feder (25) mit dem Einsatz an einer Position verbunden ist, die zum ersten Ende (21), um das der Einsatz gegen die Sperrklinke (10) schwenkt, exzentrisch ist.
2. Ein Schloß gemäß Anspruch 1, dadurch gekennzeichnet, daß der Einsatz (20) in einer konkaven Ausbuchtung, die von einem der Gabel (6) zugewandten hakenförmigen Ende (15) der Sperrklinke (10) begrenzt ist, untergebracht

5 ist und mittels des Endes und unter der Wirkung der Feder (25) vorspringend mit einer Aussparung (27) in der Sperrklinke in Eingriff ist; wobei diese letztere und das erste Ende (21) des Einsatzes durch ein komplementäres halbkreisförmiges Profil begrenzt sind, um so einen Drehpunkt für diesen Einsatz zu definieren.

10 3. Ein Schloß gemäß Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Einsatz (20) seitlich mit einem vorstehenden Ansatz (26) versehen ist, der mit Spiel in einen Sitz (27) eingreift, der in der Sperrklinke vorgesehen und durch ein Paar von gegenüberliegenden Anschlagschultern (28, 29) definiert ist, die so angeordnet sind, daß sie mit dem Ansatz zusammenwirken, um den Winkel zu begrenzen, um den sich der Einsatz drehen kann.

15 4. Ein Schloß gemäß Anspruch 3, dadurch gekennzeichnet, daß die Feder (25) mit dem Einsatz (20) an einem Punkt (30) verbunden ist, der von der durch das Ende (21) verlaufenden Drehachse in Richtung zum Ansatz (26) versetzt ist und sich näher am Ende (22) als der Ansatz (26) befindet.

20 5. Ein Schloß gemäß Anspruch 3 oder 4, dadurch gekennzeichnet, daß die Feder (25) einen Zwischenbereich (40), der um einen Trägerstift (11) für die Sperrklinke gewunden ist, sowie ein Paar von V-förmigen gegenüberliegenden Armen (41, 42) aufweist, wovon ein erster (41) mit dem Einsatz (20) verbunden ist und der zweite (42) so angebracht ist, daß er die Sperrklinke (10) auf der dem Einsatz gegenüberliegenden Seite vorspannt.

#### Revendications

1. Serrure de véhicule, du type comprenant une tige de gâche (4), une fourchette pivotante (6) qui vient en prise avec ladite tige, et un loquet (10) agencé pour venir en contact avec une partie en forme de crochet (16) de ladite fourchette afin d'empêcher sa rotation lorsque ladite fourchette est en tige, avec la dite prise, caractérisée en ce qu'elle comprend également un insert pivotant (20) qui pivote, à une première extrémité (21), contre le loquet de manière à être interposé entre la fourchette et le loquet lorsque la fourchette est en prise avec ladite tige ; ledit insert étant agencé pour coopérer, au moyen de sa deuxième extrémité (22) distante de la première, avec une partie en forme de crochet (16) de la fourchette, et étant tiré rigidement vers le loquet (10)

- par un ressort (25) relié à l'insert de façon excentrée par rapport à la première extrémité (21) autour de laquelle l'insert pivote contre le loquet (10).
2. Serrure suivant la revendication 1, caractérisée en ce que ledit insert (20) est logé dans une concavité délimitée par une extrémité en forme de crochet (15) dudit loquet (10) qui fait face à ladite fourchette (6) et, au moyen de ladite extrémité et sous l'action dudit ressort (25), il s'engage de façon saillante dans un évidement (27) dudit loquet, cet évidement et ladite première extrémité (21) de l'insert étant délimités par un profil semi-circulaire conjugué, de façon à définir un axe de rotation pour ledit insert.
3. Serrure suivant la revendication 1 ou 2, caractérisée en ce que ledit insert (20) comporte latéralement un appendice saillant (26) qui s'engage avec jeu dans un siège (27) prévu dans le loquet et défini par deux épaulements de butée respectifs opposés (28,29) agencés pour coopérer avec ledit appendice de manière à limiter l'angle dont l'insert peut tourner.
4. Serrure suivant la revendication 3, caractérisée en ce que ledit ressort (25) est connecté audit insert (20) à un point (30) qui se trouve sur le côté de la ligne centrale passant par ladite première extrémité (21), dans la direction de l'appendice (26), et qui est situé plus près de ladite deuxième extrémité (22) de l'insert que ne l'est ledit appendice (26).
5. Serrure suivant la revendication 3 ou 4, caractérisée en ce que ledit ressort (25) comprend une partie intermédiaire (40) enroulée autour d'un axe support (1) dudit loquet, et deux branches opposées en forme de V (41,42) dont une première (41) est connectée audit insert (20) et dont la deuxième (42) est placée en chevauchement sur ledit loquet (10) du côté opposé audit insert.

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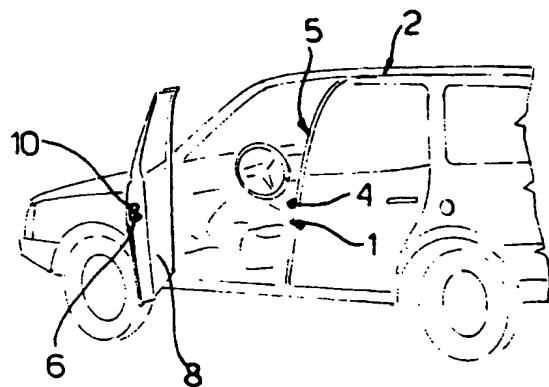


Fig. 1

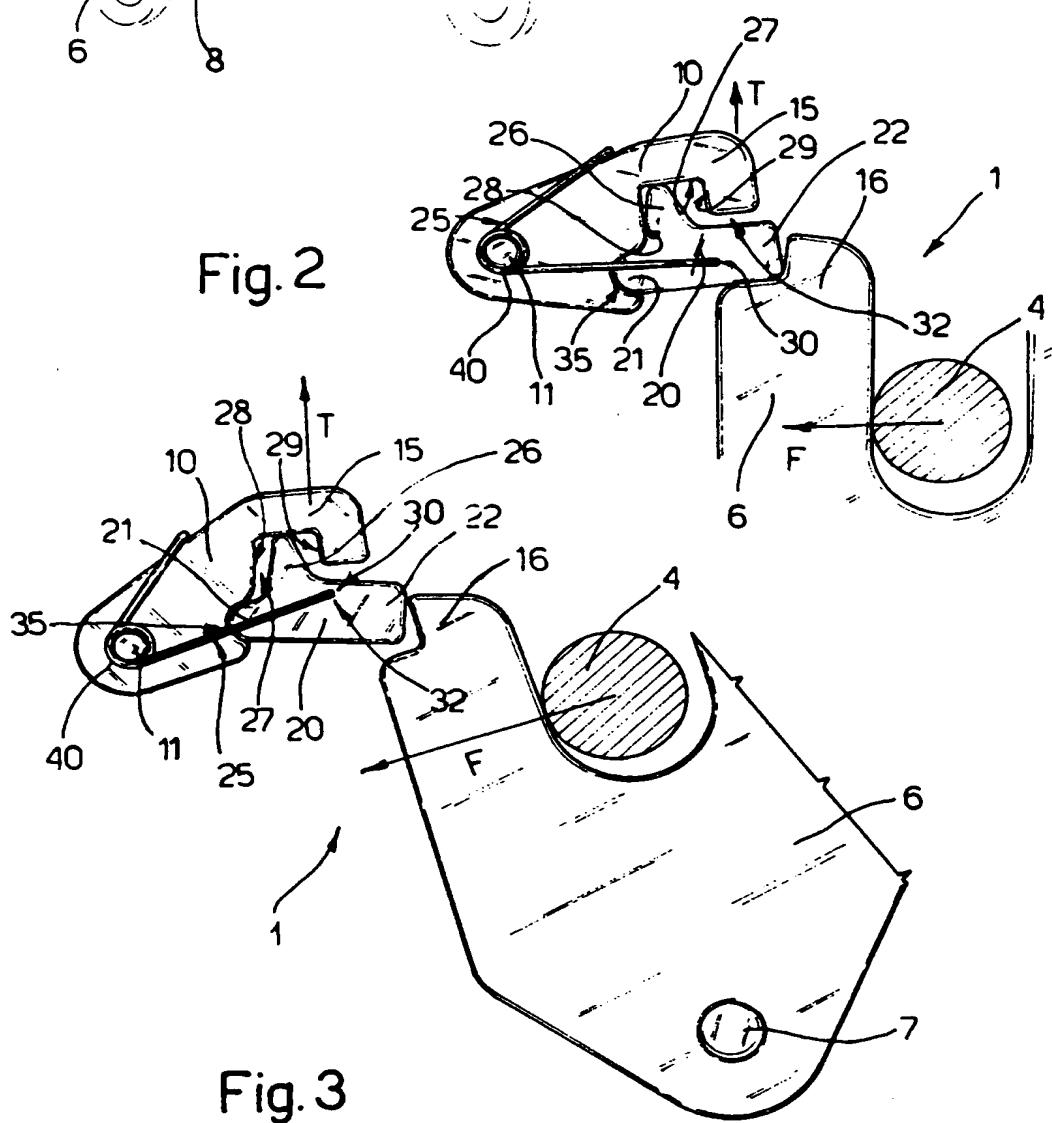


Fig. 3